MEA Workstation

System for recording and analyzing microelectrode arrays

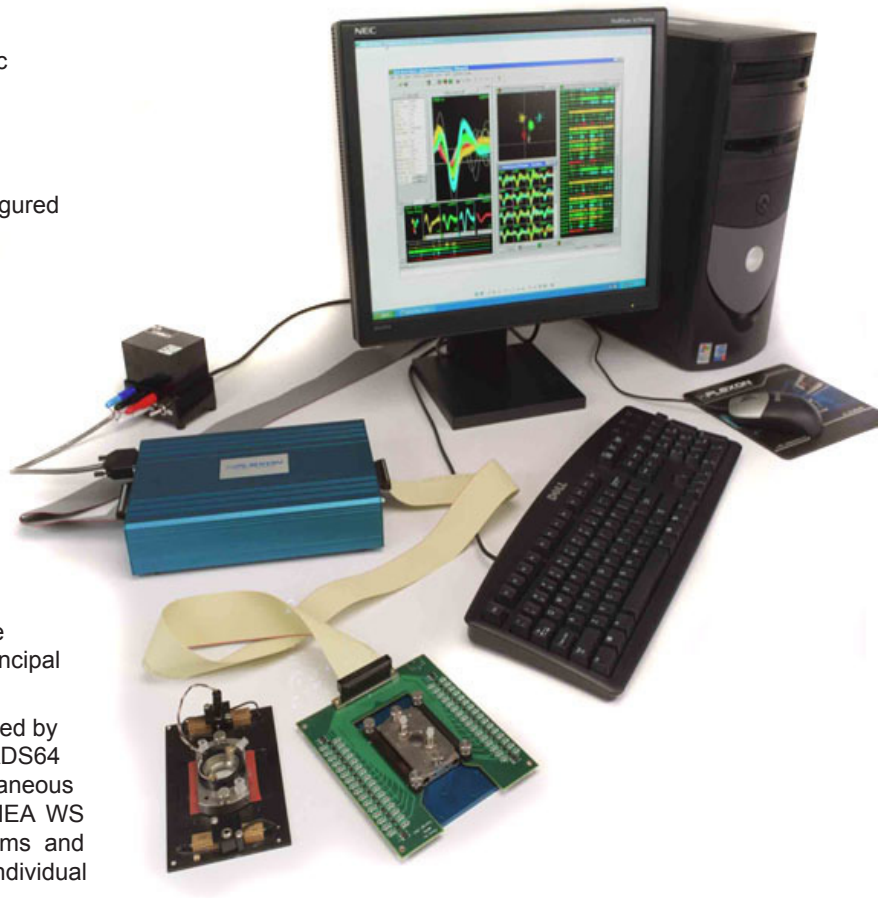
Features

- Online spike sorting via template sorting or time-voltage discriminator windows
- Several methods of automatic spike waveform identification
- Automatic thresholding and automatic template adaptation
- Online viewing of continuous signals, thresholded spikes, activity rasters, and 2D and 3D cluster displays
- Multi-channel waveform display configured for standard MEA electrode layouts
- Open file format; recorded spikes and/or continuous signals can be accessed via NeuroExplorer®, MATLAB® or C/C++® programs

Description

MEA Workstation (MEA WS) is a complete system for recording and analyzing up to 64 channels of microelectrode arrays (MEAs). The MEA Workstation uses the MEA WS suite of software programs, which computes and displays real-time statistical features of the spike waveforms in three-dimensional Principal Component Analysis (PCA) space.

The recorded signals are amplified and filtered by the Plexon Preamplifier, and then sent to the ADS64 acquisition device, which provides simultaneous 16-bit sampling at 40 kHz per channel. MEA WS software then displays the spike waveforms and separates them into units that represent individual neurons.



Typical MEA workstation with PC, data acquisition cards, preamp, and headstage.

MEA Workstation Software

The MEA workstation ships with all of the software required to acquire and analyze data including MEA Sort Client, the system's primary control program.

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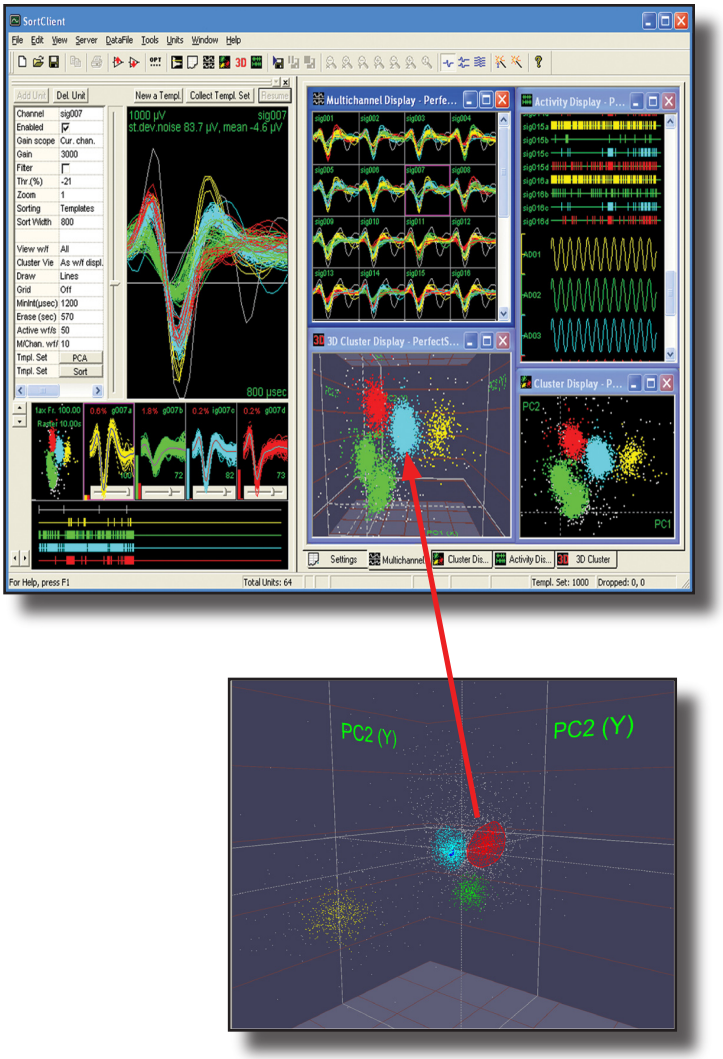
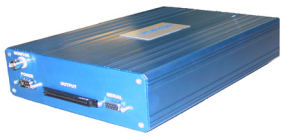
MEA Sort Client, the primary user interface for MEA Workstation, provides a complete environment for visualizing, analyzing and recording spike waveforms. The main window of Sort Client displays the waveforms in various views to facilitate detection and classification of the spikes. As shown in the close up view of the 3D Cluster Display (below), a cluster of points, which represents an individual spike, can easily be selected by drawing a boundary around it, which then establishes a template for sorting.



In addition to MEA Sort Client, the MEA Workstation software suite includes these other programs:

- **Graphical Activity Client** - Real time display for monitoring spike activity or continuous waveforms
- **Grid Monitor Client** - Real-time display of spike-rate activity as an animated color grid
- **PeriEvent Client** - Real-time display of histograms and perievent rasters
- **PlexNet** - Real-time broadcast of MEA Workstation data to other computers within a TCP/IP (Ethernet) network
- **Client Development Kit** - Sample code for developing custom applications in C/C++ or MATLAB
- **MEA Server** - Interface for transferring commands and data to and from the MEA acquisition hardware

MEA Workstation Technical Specifications

System Requirements	Windows® operating system
A/D Conversion Rate	Simultaneous 40 kHz (25 microseconds) on each channel at a 16-bit resolution
Digital Inputs	Up to 2, for external synchronization and experiment-state variables from experimental equipment, such at TTL lines
Compatibility	University of North Texas micro-electrode arrays and the Multi Channel Systems MEA preamplifier
Preamplifiers  *MEA Preamp*  *Headstage Preamp*	• Software programmable gain from 2500 to 17500 • Zero-latency analog monitoring output • Connections for TTL event inputs • Used with Plexon Headstage Preamplifier for UNT MMEP arrays only (MCS systems come with their own headstage amplifier)